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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/856,323	05/18/2001	Jaesung Han	37332-152134	6860

23973 7590 05/11/2004

DRINKER BIDDLE & REATH  
ONE LOGAN SQUARE  
18TH AND CHERRY STREETS  
PHILADELPHIA, PA 19103-6996

EXAMINER

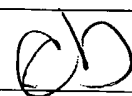
KERNS, KEVIN P

ART UNIT	PAPER NUMBER
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1725

DATE MAILED: 05/11/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/856,323	HAN ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Kevin P. Kerns	1725	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 April 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) 8 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☒ Claim(s) 1,5 and 7 is/are objected to.
- 8) ☒ Claim(s) 1-8 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 May 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>7/2/01</u> .  | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicants' election of Group I (claims 1-7) in the paper received on April 8, 2004 is acknowledged. Because the applicants did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

### ***Drawings***

2. Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### ***Specification***

3. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

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4. The abstract of the disclosure is objected to because it is believed that the term "raffinate" should be changed to "reformat" to be consistent with conventional terminology in the art. Correction is required. See MPEP § 608.01(b).

5. The disclosure is objected to because of the following informalities: on page 11, line 27, "25" should be changed to "26" after "outlets". On page 15, line 21, "16" should be changed to "17" after "inlet". Throughout the specification, it is believed that the term "raffinate" should be changed to "reformat" to be consistent with conventional terminology in the art. Appropriate correction is required.

#### ***Claim Objections***

6. Claims 1, 5, and 7 are objected to because of the following informalities: in claim 1, it is believed that the term "raffinate" should be changed to "reformat" to be consistent with conventional terminology in the art. In claim 5, 4<sup>th</sup> line, as well as claim 7, 3<sup>rd</sup> line, "a" should be added before "diffusion". Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edlund et al. (US 5,997,594) in view of JP 5-155602.

Edlund et al. disclose a steam reformer system with internal hydrogen purification to obtain hydrogen for fuel cells in unit modules, in which the system includes cylindrically shaped inner and outer housings (50,52) radially spaced from each other and having top and bottom walls (Figure 3); a hydrogen separation reaction chamber within the inner housing (hydrogen transport region 64), with the hydrogen separation reaction chamber containing a plurality of centrally arranged and spaced membrane envelope plates (metal films) in Figures 10 and 11, including annular support plates (two end plates), a support layer between the metal films (2<sup>nd</sup> or 4<sup>th</sup> of 5 plates in Figure 11), and a central support disk with radial holes arranged inside the support layer (3<sup>rd</sup> of 5 plates in Figure 11), all of which are attached by brazing, soldering, or (ultrasonic or diffusion) welding; a combustion catalyst chamber 60 with catalyst 100 arranged within

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chamber 60; a fuel inlet (30,30a) provided at the top wall of the inner housing 50; a plurality of spaced hydrogen gas separation cells arranged in the hydrogen separation reaction chamber; a steam reforming catalyst (precious metal including palladium at an optimum weight %); a plurality of spaced cylindrical support members (for supporting the thin film plates); a permeate discharge tube in the form of orifice 120; a plurality of reformat outlets; and a plurality of combustion fuel/air inlets (abstract; column 2, lines 18-65; column 3, lines 12-67; column 4, lines 1-31; column 5, lines 19-67; column 6, lines 1-67; column 7, lines 1-22 and 38-67; column 8, line 1 through column 23, line 32; column 25, line 1 through column 28, line 62; and Figures 1-24). Edlund et al. do not specifically disclose the use of a steam reforming catalyst between adjacent hydrogen gas separating cells.

However, JP 5-155602 discloses a steam reforming reactor with concentric multiple stages, in which the reactor includes catalyst layers (1,2) between adjacent hydrogen separation cells, for the purpose of obtaining a compact fuel reformer to efficiently produce hydrogen for a fuel cell (abstract; and Figures 1-8).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the steam reformer system disclosed by Edlund et al., by adding the additional catalyst layers between adjacent hydrogen separation cells, in order to obtain a compact fuel reformer to efficiently produce hydrogen for a fuel cell (JP 5-155602; abstract).

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10. Claims 1 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shirasaki et al. (US 5,639,431) in view of JP 5-155602.

Shirasaki et al. disclose a hydrogen producing apparatus by steam reforming, in which the apparatus includes cylindrically shaped inner and outer housings (14,18,20) radially spaced from each other and having top and bottom walls (Figures 1 and 2); a hydrogen separation reaction chamber within the inner housing (annular region containing reforming catalyst layer 30), with the hydrogen separation reaction chamber containing a plurality of hydrogen-permeable tubes 32; a combustion catalyst chamber heated by combustion burner 44 with combustion catalyst layer 88 arranged within chamber (column 16, lines 18-30; and Figure 8); a fuel gas tube 148 and a raw material gas (fuel) inlet 154 provided at the top wall of the inner annular housing (column 18, lines 38-62; and Figures 10-15); a plurality of spaced hydrogen gas separation cells arranged in the hydrogen separation reaction chamber; a steam reforming catalyst (nickel and/or a precious metal including palladium at an optimum weight %); a plurality of spaced cylindrical support members (for supporting the hydrogen gas separation cells); a permeate discharge tube; and a plurality of reformat outlets with a further plurality of combustion fuel/air inlets, in the upper left side (denoted by inlet/outlet arrows) of the pertinent figures (abstract; column 2, line 22 through column 7, line 65; column 8, lines 36-44; column 9, line 35 through column 12, line 6; column 13, line 56 through column 20, line 41; column 21, line 58 through column 24, line 38; column 25, line 41 through column 28, line 22; column 29, line 30 through column 32, line 20; column 33, line 50 through column 36, line 33; column 38, line 4 through column 40, line

57; and Figures 1-8 and 10-47). Shirasaki et al. do not specifically disclose the use of a steam reforming catalyst between adjacent hydrogen gas separating cells.

However, JP 5-155602 discloses a steam reforming reactor with concentric multiple stages, in which the reactor includes catalyst layers (1,2) between adjacent hydrogen separation cells, for the purpose of obtaining a compact fuel reformer to efficiently produce hydrogen for a fuel cell (abstract; and Figures 1-8).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the hydrogen producing apparatus disclosed by Shirasaki et al., by adding the additional catalyst layers between adjacent hydrogen separation cells, in order to obtain a compact fuel reformer to efficiently produce hydrogen for a fuel cell (JP 5-155602; abstract).

### ***Conclusion***

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The Wight, Collins et al., Myrna et al., Isomura et al., and Buxbaum references are also cited as related art.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Kevin P. Kerns whose telephone number is (571) 272-1178. The examiner can normally be reached on Monday-Friday from 8:00am-5:00pm.



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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Dunn can be reached on (571) 272-1171. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kevin P. Kerns *Kevin Kerns 5/7/04*  
Examiner  
Art Unit 1725

KPK  
kpk  
May 7, 2004